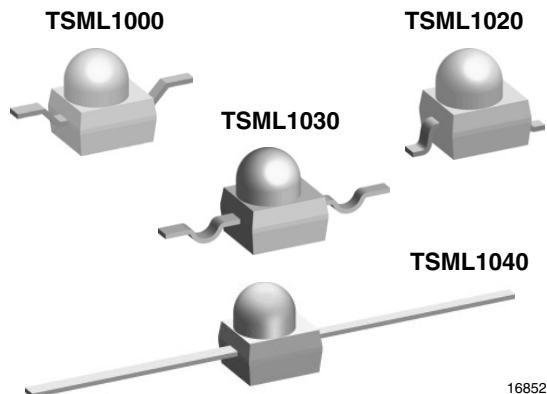


## High Power Infrared Emitting Diode, RoHS Compliant, 940 nm, GaAlAs/GaAs



### FEATURES

- Package type: surface mount
- Package form: GW, RGW, yoke, axial
- Dimensions (L x W x H in mm): 2.5 x 2 x 2.7
- Peak wavelength:  $\lambda_p = 940$  nm
- High radiant power
- High radiant intensity
- Angle of half intensity:  $\phi = \pm 12^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Good spectral matching with Si photodetectors
- Versatile terminal configurations
- Package matches with detector TEMT1000
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### DESCRIPTION

TSML1000 is an infrared, 940 nm emitting diode in GaAlAs/GaAs with high radiant power molded in a clear, untinted plastic package (with lens) for surface mounting (SMD).

### APPLICATIONS

- For remote control
- Punched tape readers
- Encoder
- Photointerrupters

| PRODUCT SUMMARY |               |              |                  |            |
|-----------------|---------------|--------------|------------------|------------|
| COMPONENT       | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
| TSML1000        | 7             | $\pm 12$     | 940              | 800        |
| TSML1020        | 7             | $\pm 12$     | 940              | 800        |
| TSML1030        | 7             | $\pm 12$     | 940              | 800        |
| TSML1040        | 7             | $\pm 12$     | 940              | 800        |

**Note**

Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION |               |                              |                  |
|----------------------|---------------|------------------------------|------------------|
| ORDERING CODE        | PACKAGING     | REMARKS                      | PACKAGE FORM     |
| TSML1000             | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Reverse gullwing |
| TSML1020             | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Gullwing         |
| TSML1030             | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Yoke             |
| TSML1040             | Bulk          | MOQ: 1000 pcs, 1000 pcs/bulk | Axial leads      |

**Note**

MOQ: minimum order quantity

| ABSOLUTE MAXIMUM RATINGS |                                |           |       |      |
|--------------------------|--------------------------------|-----------|-------|------|
| PARAMETER                | TEST CONDITION                 | SYMBOL    | VALUE | UNIT |
| Reverse voltage          |                                | $V_R$     | 5     | V    |
| Forward current          |                                | $I_F$     | 100   | mA   |
| Peak forward current     | $t_p/T = 0.5, t_p = 100 \mu s$ | $I_{FM}$  | 200   | mA   |
| Surge forward current    | $t_p = 100 \mu s$              | $I_{FSM}$ | 1.0   | A    |



# TSML1000, TSML1020, TSML1030, TSML1040

High Power Infrared Emitting Diode, Vishay Semiconductors  
RoHS Compliant, 940 nm, GaAlAs/GaAs

| ABSOLUTE MAXIMUM RATINGS            |   |            |               |      |
|-------------------------------------|---|------------|---------------|------|
| PARAMETER                           | TEST CONDITION                                  | SYMBOL     | VALUE         | UNIT |
| Power dissipation                   |   | $P_V$      | 190           | mW   |
| Junction temperature                |   | $T_j$      | 100           | °C   |
| Operating temperature range         |   | $T_{amb}$  | - 40 to + 85  | °C   |
| Storage temperature range           |   | $T_{stg}$  | - 40 to + 100 | °C   |
| Soldering temperature               | $t \leq 5$ s                                    | $T_{sd}$   | < 260         | °C   |
| Thermal resistance junction/ambient | Soldered on PCB, pad dimensions:<br>4 mm x 4 mm | $R_{thJA}$ | 400           | °C   |

**Note**

$T_{amb} = 25$  °C, unless otherwise specified

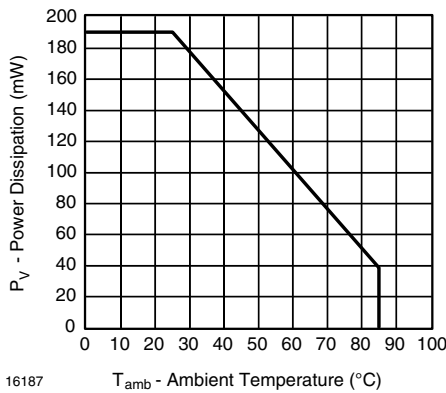


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature



Fig. 2 - Forward Current vs. Ambient Temperature

| BASIC CHARACTERISTICS                  |                                   |                  |      |          |      |         |
|--|-----------------------------------|------------------|------|----------|------|---------|
| PARAMETER                              | TEST CONDITION                    | SYMBOL           | MIN. | TYP.     | MAX. | UNIT    |
| Forward voltage                        | $I_F = 20$ mA, $t_p = 20$ ms      | $V_F$            |      | 1.2      | 1.5  | V       |
|  | $I_F = 1$ A, $t_p = 100$ $\mu$ s  | $V_F$            |      | 2.6      |      | V       |
| Temperature coefficient of $V_F$       | $I_F = 1$ mA                      | $TK_{V_F}$       |      | - 1.8    |      | mV/K    |
| Reverse current                        | $V_R = 5$ V                       | $I_R$            |      |          | 10   | $\mu$ A |
| Junction capacitance                   | $V_R = 0$ V, $f = 1$ MHz, $E = 0$ | $C_j$            |      | 25       |      | pF      |
| Radiant intensity                      | $I_F = 20$ mA, $t_p = 20$ ms      | $I_e$            | 3    | 7        | 15   | mW/sr   |
| Radiant power                          | $I_F = 100$ mA, $t_p = 20$ ms     | $\phi_e$         |      | 35       |      | mW      |
| Temperature coefficient of $\phi_e$    | $I_F = 20$ mA                     | $TK_{\phi_e}$    |      | - 0.6    |      | %/K     |
| Angle of half intensity                |                                   | $\varphi$        |      | $\pm 12$ |      | deg     |
| Peak wavelength                        | $I_F = 100$ mA                    | $\lambda_p$      |      | 940      |      | nm      |
| Spectral bandwidth                     | $I_F = 100$ mA                    | $\Delta\lambda$  |      | 50       |      | nm      |
| Temperature coefficient of $\lambda_p$ | $I_F = 100$ mA                    | $TK_{\lambda_p}$ |      | 0.2      |      | nm/K    |
| Rise time                              | $I_F = 100$ mA                    | $t_r$            |      | 800      |      | ns      |
| Fall time                              | $I_F = 100$ mA                    | $t_f$            |      | 800      |      | ns      |
| Virtual source diameter                |                                   | $d$              |      | 1.2      |      | mm      |

**Note**

$T_{amb} = 25$  °C, unless otherwise specified

## BASIC CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

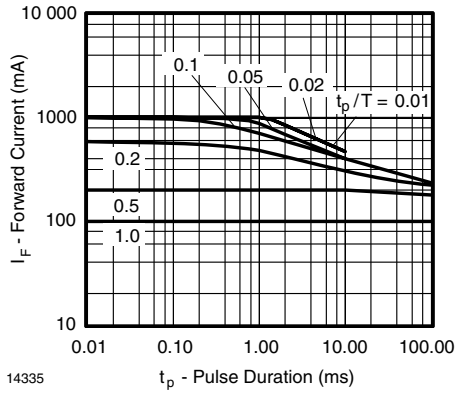


Fig. 3 - Pulse Forward Current vs. Pulse Duration

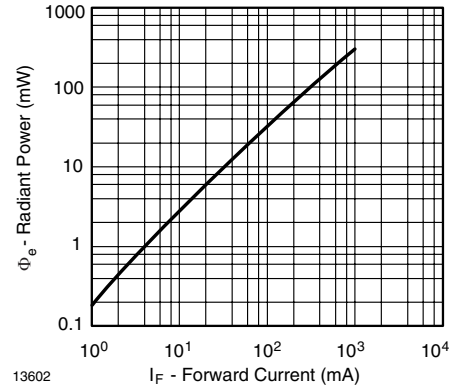


Fig. 6 - Radiant Power vs. Forward Current

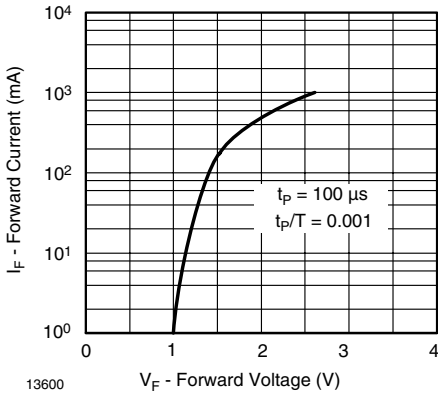


Fig. 4 - Forward Current vs. Forward Voltage

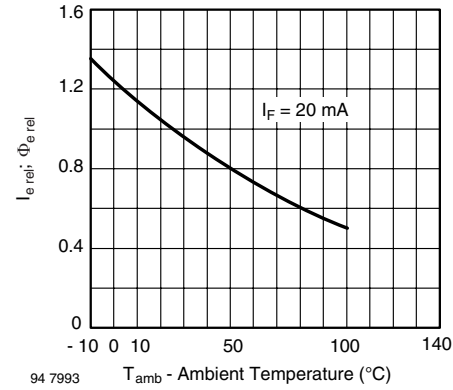


Fig. 7 - Relative Radiant Intensity/Power vs. Ambient Temperature

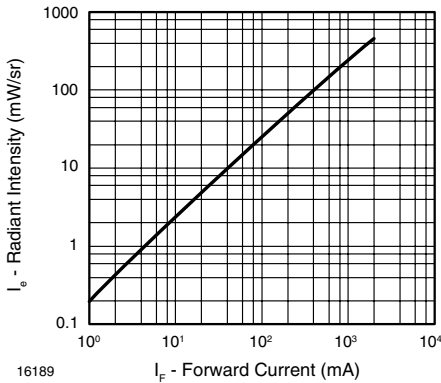


Fig. 5 - Radiant Intensity vs. Forward Current

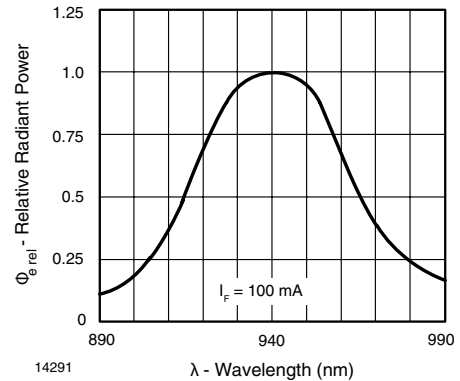


Fig. 8 - Relative Radiant Power vs. Wavelength



# TSML1000, TSML1020, TSML1030, TSML1040

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RoHS Compliant, 940 nm, GaAlAs/GaAs

## REFLOW SOLDER PROFILE

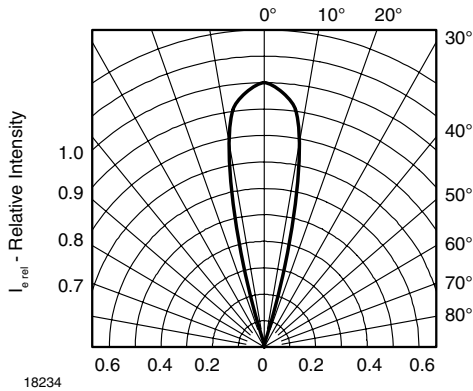


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

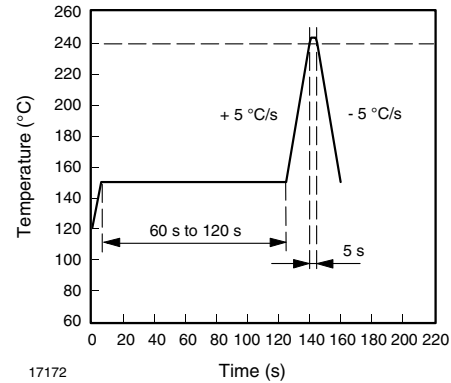


Fig. 10 - Lead Tin (SnPb) Reflow Solder Profile

## PRECAUTIONS FOR USE

### 1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (burn out will happen).

### 2. Storage

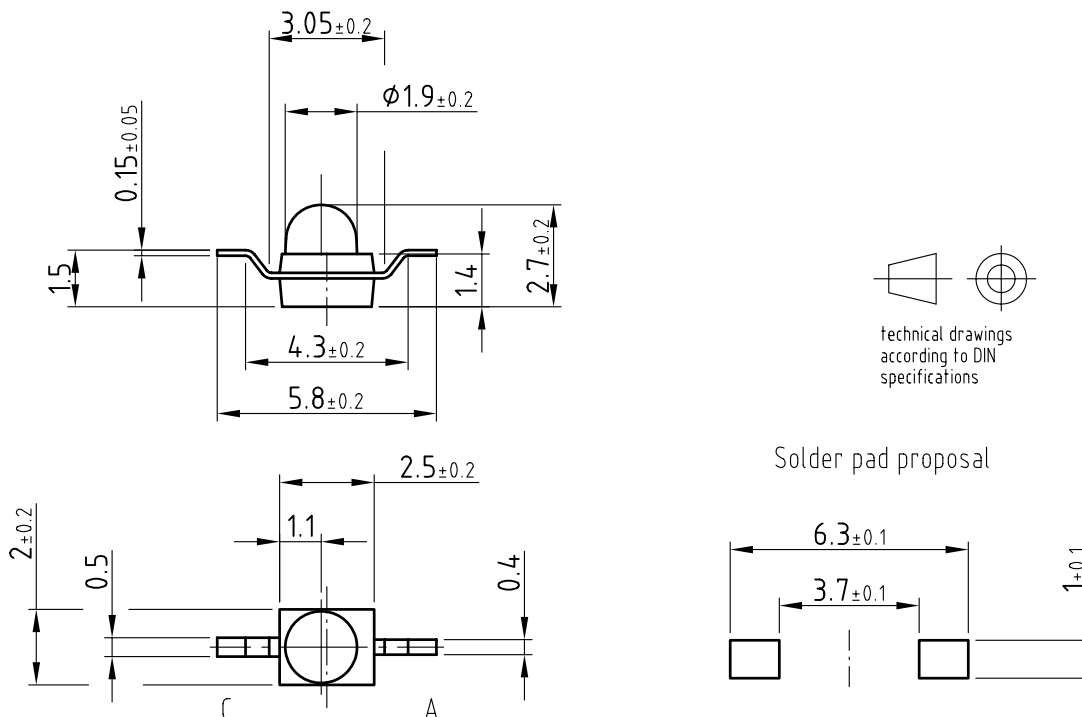
- 2.1 Storage temperature and rel. humidity conditions are: 5 °C to 35 °C, R.H. 60 %.
- 2.2 Floor life must not exceed 168 h, acc. to JEDEC level 3, J-STD-020.  
Once the package is opened, the products should be used within a week. Otherwise, they should be kept in a damp proof box with desiccant.  
Considering tape life, we suggest to use products within one year from production date.
- 2.3 If opened more than one week in an atmosphere 5 °C to 35 °C, R.H. 60 %, devices should be treated at 60 °C  $\pm$  5 °C for 15 h.
- 2.4 If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3.

# TSML1000, TSML1020, TSML1030, TSML1040



Vishay Semiconductors High Power Infrared Emitting Diode,  
RoHS Compliant, 940 nm, GaAlAs/GaAs

## PACKAGE DIMENSIONS in millimeters: TSML1000

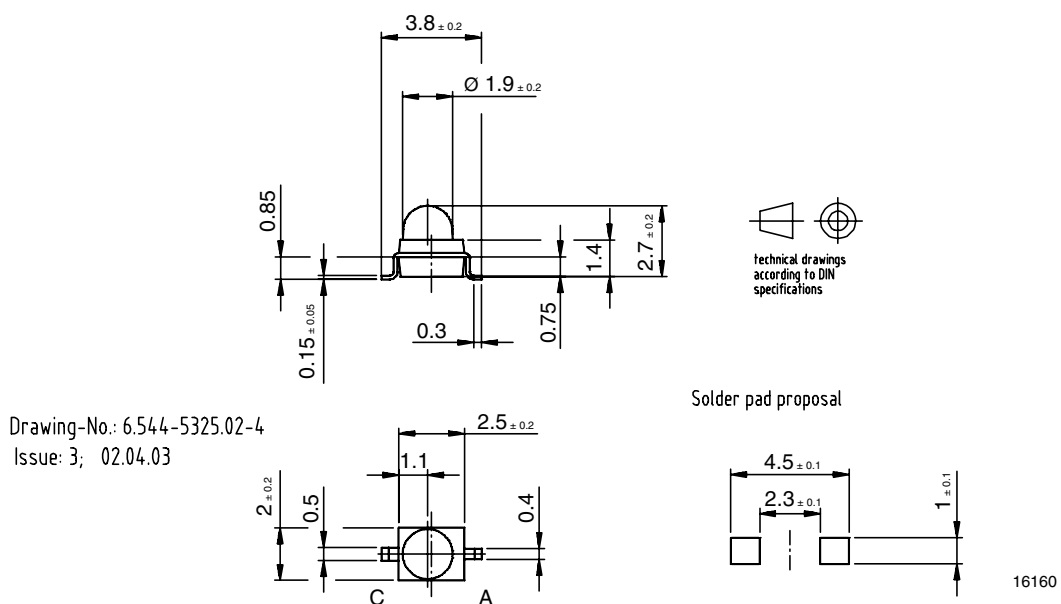


Drawing-No.: 6.544-5326.02-4

Issue: 3; 02.04.03

16159

## PACKAGE DIMENSIONS in millimeters: TSML1020



Drawing-No.: 6.544-5325.02-4

Issue: 3; 02.04.03

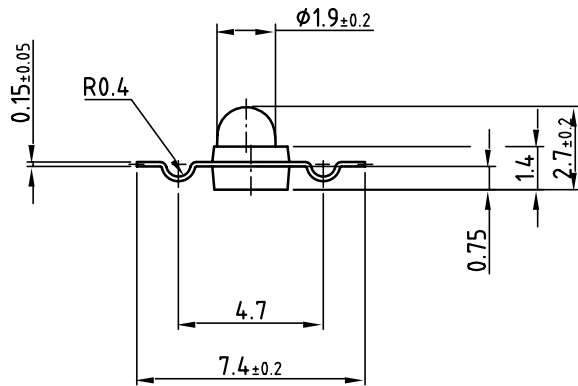
16160



# TSML1000, TSML1020, TSML1030, TSML1040

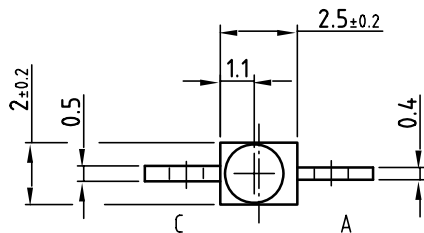
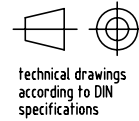
High Power Infrared Emitting Diode, Vishay Semiconductors  
RoHS Compliant, 940 nm, GaAlAs/GaAs

## PACKAGE DIMENSIONS in millimeters: TSML1030

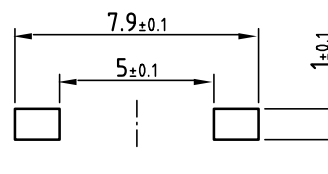


Drawing-No.: 6.544-5329.01-4

Issue: 4; 08.05.03

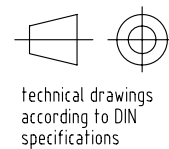
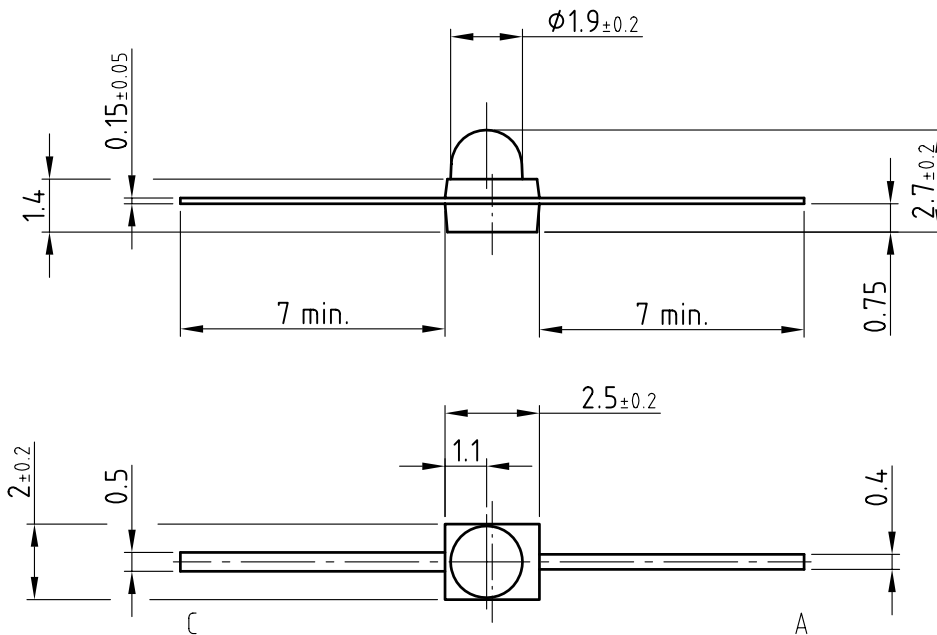


Solder pad proposal



16228

## PACKAGE DIMENSIONS in millimeters: TSML1040



Drawing-No.: 6.544-5339.02-4

Issue: 3; 02.04.03

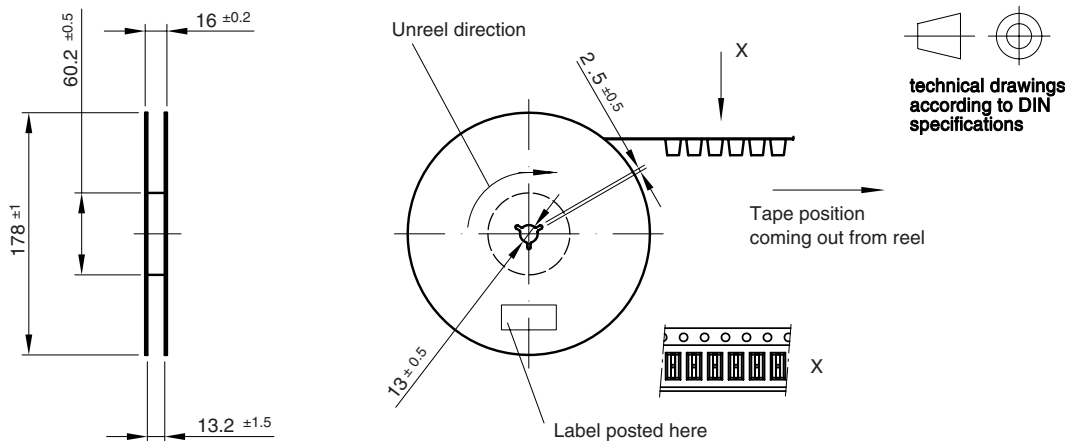
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# TSML1000, TSML1020, TSML1030, TSML1040

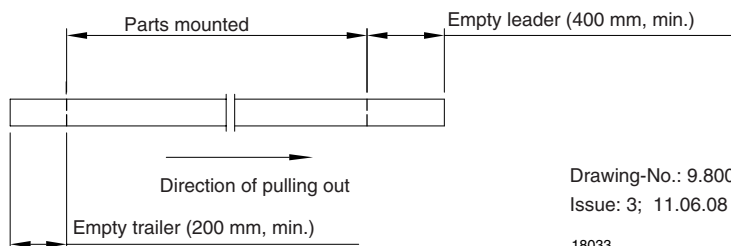


Vishay Semiconductors High Power Infrared Emitting Diode,  
RoHS Compliant, 940 nm, GaAlAs/GaAs

## REEL DIMENSIONS in millimeters



Leader and trailer tape:

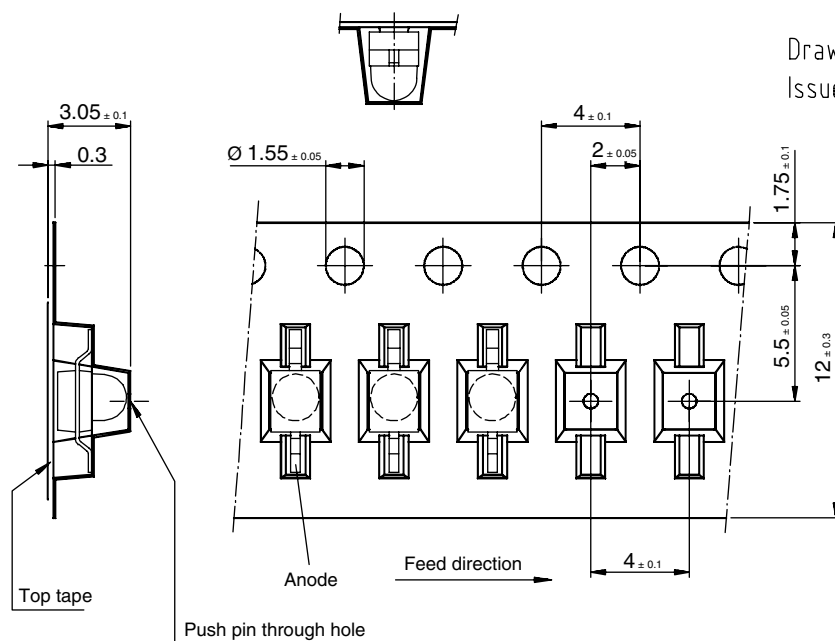


Drawing-No.: 9.800-5080.01-4

Issue: 3; 11.06.08

18033

## TAPING DIMENSIONS in millimeters: TSML1000



Drawing-No.: 9.700-5268.01-4

Issue: 2; 22.11.02

Quantity per reel: 1000 pcs or 5000 pcs

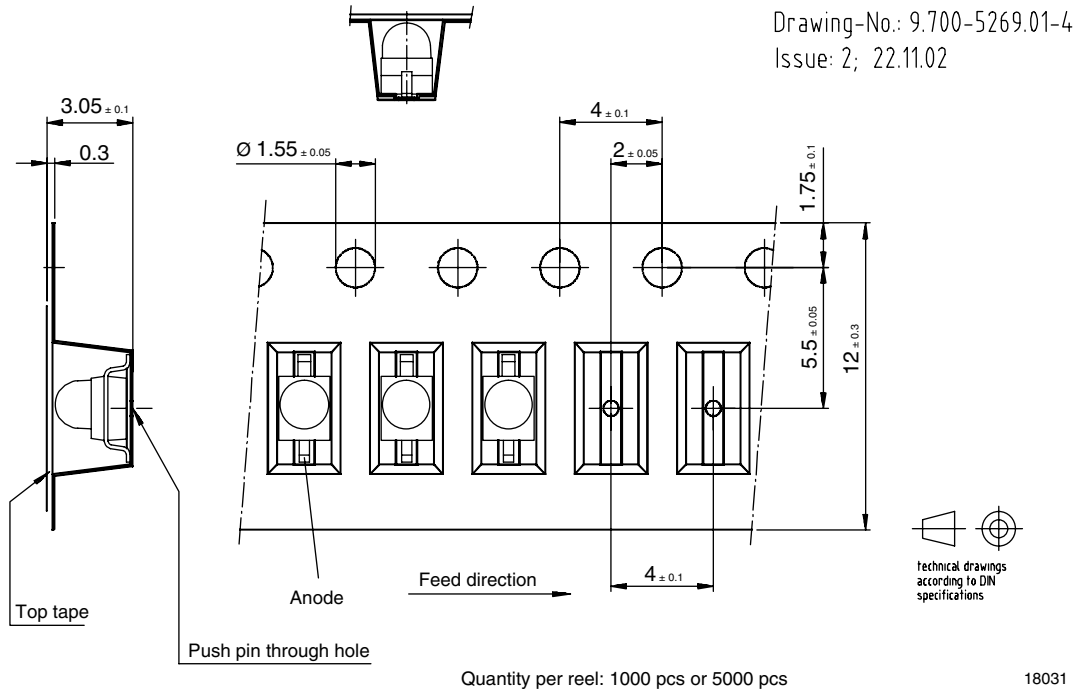
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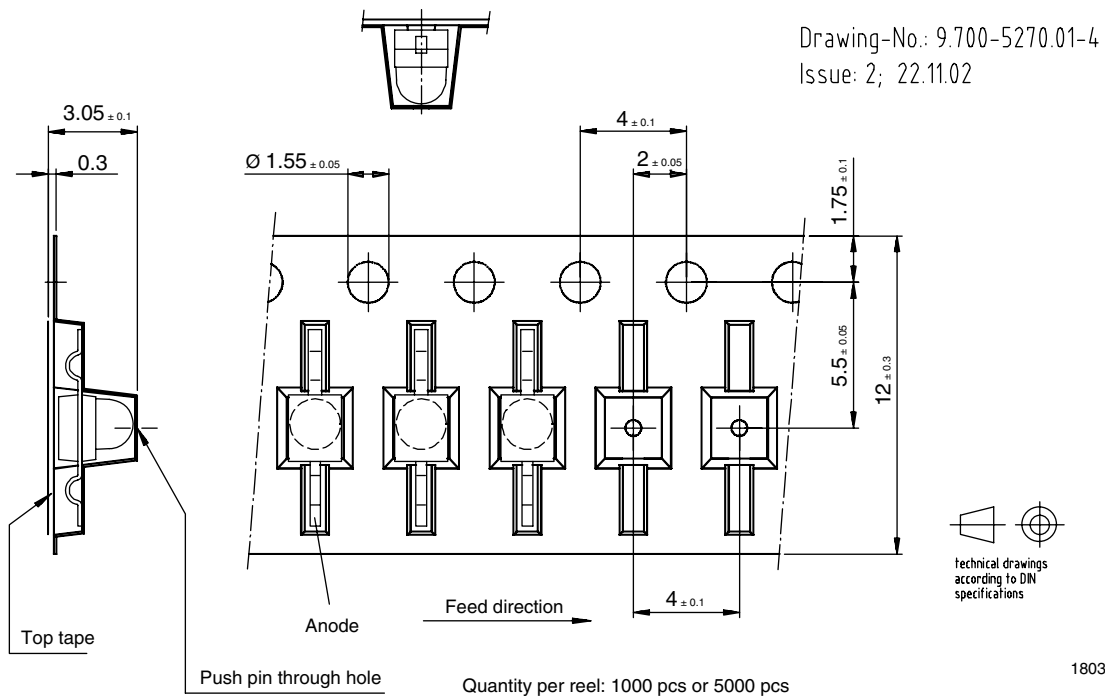
# TSML1000, TSML1020, TSML1030, TSML1040

High Power Infrared Emitting Diode, Vishay Semiconductors  
RoHS Compliant, 940 nm, GaAlAs/GaAs

## TAPING DIMENSIONS in millimeters: TSML1020



## TAPING DIMENSIONS in millimeters: TSML1030







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